

July 9, 2004

DECLARATION

The undersigned, Dana Scruggs, having an office at 8902B Otis Avenue, Suite 204B, Indianapolis, Indiana 46216, hereby states that she is well acquainted with both the English and German languages and that the attached is a true translation to the best of her knowledge and ability of PCT/DE 03/00379 (INV.: GANSEL, E., ET AL), entitled "Manual Grinding Tool".

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.



Dana Scruggs

1 MANUAL GRINDING TOOL

2
3 Background Information

4
5 The present invention concerns a manual grinding tool according to the general
6 class of Claim 1.

7
8 An orbital sander with a sanding plate on which abrasive sheets are installed is
9 made known in GB patent publication 23 22 582; the abrasive sheets are
10 capable of resting with their back against the underside of the sanding plate and
11 are clampable in place on their top side. The underside of the abrasive sheets,
12 where sanding means are provided, faces downward/outwardly and, when the
13 abrasive sheet carrier is mounted on a workpiece, it is usable for sanding.

14
15 The operator must use both hands to clamp the abrasive sheets in place, and the
16 hand power tool should be placed on a solid surface. Using one hand, one end of
17 the abrasive sheet is inserted into a slit between an opened clamping jaw and the
18 top side of the abrasive sheet carrier, and the clamping jaw is held open in the
19 release position until the end of the abrasive sheet is inserted so that it closes via
20 spring force when the clamping jaw is released. This is the clamped position in
21 which the abrasive sheet end is fixed. The abrasive sheet is automatically
22 tightened to a certain extent in that the rotatably mounted clamping jaw tries to
23 roll away from the abrasive sheet end, thereby carrying it along, due to an
24 inclined-plane contact surface on the top side of the abrasive sheet carrier.

25
26 The same procedure is used with the other abrasive sheet end as is used with
27 the first abrasive sheet end, whereby the clamping force and tightening force of
28 the clamping means are limited.

29
30 The same disadvantages also apply for the abrasive sheet clamping system
31 according to US 3 540 161.

Advantages of the Invention

The manual grinding tool according to the present invention having the characterizing features of Claim 1 has the advantage of particularly convenient, rapid clamping—combined with the abrasive sheet being stretched tight—using only one hand, with simplified manufacture of the clamping means at lower cost and significant weight reduction. This results in increased abrasive performance and greater overall efficiency of the manual grinding tool.

Due to the fact that the first abrasive sheet end is capable of being inserted using just one hand into a self-opening slit and is automatically clampable there, and, subsequently, the second abrasive sheet end is insertable—also using just one hand—into the clamping device and is then capable of being stretched tight, to the tearing limit, the abrasive sheet is capable of being fixed quickly and safely against misuse between the two clamping points and the working surface of the abrasive sheet carrier in such a manner that it is stretched tightly and, during sanding, a relative motion between the abrasive sheet carrier and the abrasive sheet is largely prevented.

Due to the fact that the slit which clamps the first abrasive sheet end is opened using a single, central, easily located operating button to release the abrasive sheet, the operating comfort of the manual grinding tool is particularly high.

Due to the fact that one of the clamping means is configured as tongs, between the clamping jaws of which an abrasive sheet end is clampable, and due to the fact that the tongs—together with the clamped abrasive sheet end—are movable around a swivel axis and are lockable in an end position, secure clamping followed by stretching-tight of the abrasive sheet is attainable in a convenient and reliable manner using simple means.

1 The tongs have the advantage that abrasive sheets of any thickness are
2 clampable with maximum clamping force, because a long closing path enables
3 all dimensional differences to be compensated for in a sensitive manner,
4 whereby the clamping force attained is stronger than has been previously
5 achieved. In addition, abrasive sheets having different lengths—within limits—
6 can be installed on the hand power tool, because a long overhang can easily
7 form between the open active clamping jaw—configured in the shape of a half
8 ring or bracket—and the passive clamping jaw, and it can be comfortably
9 accommodated there.

10
11 *Due to the fact that the passive clamping jaw is configured as corrugated spring*
12 *sheet which is capable of being deformed around a bending region in the manner*
13 *of a hinge, the one end of which is clamped to the housing in the manner of a*
14 *transverse beam, and the free end of which has a friction lining, in particular*
15 *rubber, the desired flat spring characteristic (a small force/travel ratio) with*
16 *extremely short installation length of the passive clamping jaw is attainable in a*
17 *space-saving fashion.*

18
19 *Due to the fact that the passive clamping jaw—as viewed from the free end, from*
20 *right to left—first extends upwardly as a sine wave followed by a semi-sine wave*
21 *having a smaller amplitude, the corrugated spring sheet is reliably clampable with*
22 *the desired spring force.*

23
24 Due to the fact that the active clamping jaw is part of a two-armed clamping
25 lever, one of which said clamping levers serves as a handle which is detachably
26 lockable in the clamped position in an over-latching manner, and due to the fact
27 that the tongs, to this end, are pivotable around the swivel axis between two end
28 positions that define the clamped and released positions, it is particularly easy to
29 install an abrasive sheet.

1 *Due to the fact that the clamping lever can be pivoted into its holding position in*
2 *an over-latching manner via an over-latching hook bent inwardly toward the*
3 *housing in the manner of a barb, the tongs are lockable in a particularly*
4 *comfortable and operationally-reliable manner by pressing the clamping lever*
5 *perpendicularly and/or they are capable of being released in a failsafe manner by*
6 *pressing them toward the housing in a self-locating manner.*

7
8 Due to the fact that, with the tongs in the clamped position, the active clamping
9 jaw rests against the passive clamping jaw with a minimum clamping force
10 achievable with spring means, the clamping force at the abrasive sheet end to be
11 clamped is capable of being determined by selecting the appropriate elastic
12 means.

13
14 Due to the fact that the active clamping jaw is bent in the manner of a half ring
15 and grips around the passive clamping jaw in such a manner that it rests against
16 the outside of the passive clamping jaw to clamp the abrasive sheet and carries it
17 along when pivoted into the clamped position, a user-friendly clamping-tightening
18 mechanism with reduced risk of injury when replacing the abrasive sheet and/or
19 working with the manual grinding tool is created, because protruding edges on
20 the manual grinding tool are prevented. *A defined spring load-deflection curve of*
21 *the active clamping jaw is achieved via its bracket or arch-shaped configuration*
22 *having a certain wire diameter, so that a maximum clamping force between the*
23 *clamping jaws is established in the clamped position.*

24
25 Due to the fact that the passive clamping jaw has a full-length longitudinal notch
26 to accept the active clamping jaw, the grip between the passive clamping jaw and
27 sandpaper end is improved and the clamping force is strengthened further.

28
29 Due to the fact that, in addition to the tongs for the one abrasive sheet end,
30 clamping means for the other abrasive sheet end are provided, which said
31 clamping means act in a manner such that they allow the abrasive sheet to enter

1 in a preferred direction, but release in the reverse direction with special actuation,
2 it is possible to clamp the abrasive sheet quickly using just one hand.

3
4 In this case, one-hand operation means that, in fact, only one hand need be
5 active to insert and fix the abrasive sheet. The other hand can be used alone to
6 fix the hand power tool, e.g., to press it against a base.

7
8 Due to the fact that the clamping jaws are composed of elastic, rubber-like
9 material, the clamping servo effect becomes stronger as the clamping of the
10 abrasive sheet increases. This servo effect is also strengthened by the fact that
11 the outer contour of the clamping jaw is bent progressively with a small variation
12 in pitch.

13
14 *Due to the fact that the clamping jaws are composed of sheet metal and/or wire*
15 *and are provided with a rubber coating, they are easy-to-manufacture, lightweight*
16 *and functionally reliable.*

17
18 *Due to the fact that the clamping jaw and/or the active clamping jaw are*
19 *insertable in a groove in the housing and are secured against coming out by*
20 *means of a screw which extends partially over the groove, a high degree of*
21 *functional safety of the tongs is achieved with little effort when the sandpaper is*
22 *clamped.*

23
24 *Due to the fact that the clamping jaw is positioned horizontally and the insertion*
25 *slit must be opened wide—whereby it can even lie below the plane of the*
26 *sanding plate—the abrasive sheet need not be angled upward or bent to be*
27 *inserted into the slit; instead, it can be inserted in a self-locating, extremely*
28 *convenient—“blindly”, even—very casual manner, and then stretched tight.*

29

Due to the fact that the clamping lever is approximately 60 mm long and the active jaw has a lever length of approximately 20 mm, a convenient, secure clamping of the abrasive sheet is possible.

Drawing

Exemplary embodiments of the invention are described in greater detail in the subsequent description with reference to an associated drawing.

Figure 1 shows a side view of the manual grinding tool according to the invention with clamping device,

Figure 2 is a top view at an angle from above of the abrasive sheet carrier of a further embodiment of the manual grinding tool with clamping device,

Figure 3 is the underside view according to Figure 2,

Figure 4 is a further exemplary embodiment of the manual grinding tool according to the invention,

Figure 5 is a spacial representation of the active clamping jaw made of wire, shown alone,

Figure 6 is an active clamping jaw end, shown alone,

Figure 7 is an exemplary embodiment of the active clamping jaw end,

Figure 8 is another exemplary embodiment of the active clamping jaw end,

Figure 9 is an exemplary embodiment of a passive clamping jaw made of wire,

Figure 10 is a further exemplary embodiment of a clamping jaw made of spring wire and spring sheet, and

Figure 11 is the exemplary embodiment according to Figure 11 with opened clamping jaw.

Detailed Description of the Embodiments

Figure 1 shows a manual grinding tool 10 (orbital sander) with a housing 12 that has a handle on the outside and an electric motor on the inside (not shown). An

abrasive sheet carrier 14 is located at the bottom of housing 12, which said abrasive sheet carrier, driven by a motor, is capable of being set into oscillating motion relative to housing 12 and, as a result, can remove material from a work piece (not shown) via sanding with an abrasive sheet 16 secured tightly below on its working surface 15. The grinding dust that is created is capable of being blown out and/or suctioned up from the front side 121 toward the rear side 122 of manual grinding tool 10 via suction connecting piece 120. Abrasive sheet 16 rests with its back side against the underside of abrasive sheet carrier 14.

A clamping means designed as a two-armed clamping lever 20 with a swivel axis 24 is positioned in the front on the top side 13 of abrasive sheet carrier 14. Above swivel axis 24, clamping lever 20 is a swing arm and, below said swivel axis, it is a clamping jaw 22. It rests with its outer contour 27 bent in the shape of a saber against locking face 23 of top side 13 of abrasive sheet carrier 14. Swivel axis 24 of clamping lever 20 is located on a bracket 28 on the top side of abrasive sheet carrier 14.

A tension spring 26 bears between the top side of swing arm 21 and an abutment (not shown) in housing 12, which said tension spring can also be configured as a leg spring; it tries to pivot clamping lever 20 in the clockwise direction, whereby it presses clamping jaw 22 against locking face 23 and thereby clamps abrasive sheet end 19 in place.

In the upper region, swing arm 21 has a single, projecting knee serving as push button 211. By means of this, swing arm 21 is capable of being moved downward using a finger, whereby tension spring 26 is loaded. Clamping jaw 22 then lifts away from locking face 23, and the gap between outer contour 27 and locking face 23 opens so wide that abrasive sheet end 19 is released and can be removed.

1 The distance between swivel axis 24 of clamping lever 20 and locking face 23 is
2 smaller than the distance between swivel axis 24 and the radially outermost point
3 of outer contour 27, so that, in the position with spring preload via spring 26,
4 clamping jaw 22 bears against locking face 23 on the top side 13 of abrasive
5 sheet carrier 14. As a result, the clamping force on abrasive sheet 16 increases
6 in proportion to the forces that try to release abrasive sheet 16 against the
7 direction of insertion.

8
9 Tension spring 26 is preloaded to such a low extent that, when outer contour 27
10 of clamping jaw 22 is tapped even slightly, abrasive sheet 16 displaces said
11 clamping jaw from the outside against the direction of tension, creates the gap by
12 itself which is needed for insertion, and is easily inserted and pushed back with
13 one hand.

14
15 Clamping jaw 22 is composed at least partially of elastic, rubber-like material with
16 a high coefficient of friction that limits relative motion between abrasive sheet 16
17 and clamping jaw 22.

18
19 As viewed on the right, a clamping-tightening device configured as tongs 34 is
20 located on the rear side 122 of abrasive sheet carrier 14. It is composed of a
21 clamping lever 35 with curved active clamping jaw 36 and a handle 39 that is a
22 two-armed lever which is pivotable around a swivel axis 40. Active clamping jaw
23 36 is composed of elastic material, e.g., spring steel. Also capable of being
24 pivoted around swivel axis 40 is a clamping lever 37 that forms passive clamping
25 jaw 38 and bears against the inner contour of active clamping jaw 36 when
26 abrasive sheet 16 is tightened. The other abrasive sheet end 17, which is
27 diametrically opposed to abrasive sheet end 19, is inserted and retained between
28 passive clamping jaw 38 and active clamping jaw 36.

29
30 When tongs 34 with retained sandpaper end 17 are pivoted around swivel axis
31 40 in the counterclockwise direction, its distance from the other sandpaper end

19 increases. As a result, abrasive sheet 16 is tightened and pulled taut against the underside of abrasive sheet carrier 14. The tightening of abrasive sheet 16 is apparent in rear lower edge 118 of cushion that is pressed round in shape.

When tongs 34 are in the clamped position, clamping lever 35 assumes an end position in which handle 39 is snapped into locking groove 49 in the rear and/or lateral latching hook. By pressing latching hook 48 backward with the thumb and/or by pivoting handle 39 out of locking groove 49 against spring 50, clamping lever 35 is released; it can pivot back into its open position with spring preload via spring 42. Following said clamping lever, passive clamping jaw 38—acted upon by a further compression spring 44—moves into its own end position. Clamping lever 35, under spring preload, continues to pivot past this point until its contact surface 51 bears against the top side 47 of passive clamping jaw 38. In this stop position, tongs 34 are wide open, and the distance between active clamping jaw 36 and passive clamping jaw 38 is so great that sandpaper end 17—indicated with the dashed line—can be inserted into tongs 34 quasi blindly.

Compression spring 44, which applies preload to passive clamping jaws 38, determines and/or limits the clamping force between active clamping jaw 36 and passive clamping jaw 38.

If clamping lever 35 is released from its clamped position by releasing latching hook 48 and is pivoted around axis 40 in the clockwise direction to replace the abrasive sheet, the distance between the clamping points of sandpaper ends 17, 19 becomes shorter once more, thereby releasing tension from abrasive sheet 16, allowing it to be easily removed.

Figure 2 shows a spacial depiction of a further exemplary embodiment of abrasive sheet carrier 114 and manual grinding tool 10 according to Figure 1 as a top view diagonally from the front. A clamping lever 200 is located on front side 121, as viewed on the right, which said clamping lever essentially corresponds to

1 that in Figure 1, although it has a separate actuating button 2110 that is
2 supported in an abutment 600 in a manner that allows it to pivot around an axis
3 of rotation 610 and bears elastically against the housing (not shown) via a
4 compression spring (not shown) .

5
6 When button 2110 is actuated in the direction of arrow 333, the part of button
7 2110 located above axis 610 moves toward the housing. The part located below
8 axis 610 pivots outwardly, whereby it bears against the top part of clamping lever
9 200. When button 2110 is actuated, said clamping lever is pivoted outwardly in
10 the clockwise direction, so that clamping jaw 220 lifts away from locking surface
11 230 and an abrasive sheet end clamped therebetween can be removed, because
12 clamping force is no longer applied.

13
14 To enhance understanding of Figure 2, reference is made to the parts in Figure 1
15 having the same function and configuration. The first numeral in the reference
16 numbers in Figure 1 is duplicated and placed in front of the reference numbers of
17 the equally-acting parts in Figure 2 to distinguish them from yet match them to
18 the reference numbers in Figure 1.

19
20 As viewed on the left, abrasive sheet carrier 114 has tongs 334 on its rear side
21 122, which said tongs essentially correspond to the tongs 34 explained in
22 reference to Figure 1, but the details of which have a different configuration. A
23 clamping lever 335 for pivoting tongs 334 is located on only one side of abrasive
24 sheet carrier 114, and it is supported on this side at a stop 445 in a springy,
25 latching manner.

26
27 Tongs 334 are shown in the clamped state, in which their clamping pont and/or
28 an abrasive sheet end (not shown) has been pivoted to the greatest possible
29 distance away from clamping lever 200 on the diametrically opposed side of
30 abrasive sheet carrier 114.

31

Figure 3 shows the details of abrasive sheet carrier 114 according to Figure 2 at an angle from the rear underside, whereby the configuration of active clamping jaw 336 in interaction with passive clamping jaw 338 is clearly shown. In the clamped position shown, they bear against each other and can retain an abrasive sheet end (not shown) clamped between them pivoted away from clamping lever 200, so that an associated abrasive sheet is capable of being stretched tightly such that movement of the abrasive sheet relative to the working surface of abrasive sheet carrier 114 is minimized. The parts of clamping lever 200 explained hereinabove with regard for Figures 1 and 2 are clearly visible and will not be explained again here.

The procedure for installing an abrasive sheet 16 in manual grinding tool 10 according to Figure 1 will be explained hereinbelow: Manual grinding tool 10 with opened tongs 334 is held with one hand. Using the other hand, first abrasive sheet end 19 is inserted at clamping lever 20 on the front side of manual grinding tool 10 by pressing against outer contour 27 of clamping lever 22. A gap opens between clamping jaw 22 and locking surface 23, into which said gap abrasive sheet enters without clamping lever 20 having to be actuated separately. Even a small inserted section of the abrasive sheet end is "automatically" prevented, via strong force, from coming back out, i.e., it is clamped, and clamping lever 20 must be pivoted in the release direction to pull it back out.

When abrasive sheet 16 is slid slightly forward, abrasive sheet end 19 is inserted between clamping jaw 22 and locking face 23 so far that it extends past it by approximately 5 mm. As a result, a relatively small amount of effort is required to clamp first abrasive sheet end 19 tightly and securely to its abrasive sheet carrier 14 on the front side of manual grinding tool 10.

Subsequently, second abrasive sheet end 17 is inserted and locked in opened tongs 34 located on the rear side of abrasive sheet carrier 14. Abrasive sheet 16 is thereby stretched tightly. Since the clamping point of tongs 1334 moves along

a circuit around swivel axis 410 away from the front side of manual grinding tool 10, abrasive sheet 16 is held tightly against abrasive sheet carrier 140 and can therefore be used with high efficiency for sanding.

To remove abrasive sheet 16 from manual grinding tool 10, clamping lever 20 is moved by pressing button 211—as horizontal extension of swing arm 21—together with said button around swivel axis 24. Clamping jaw 22, with its outer contour 27, lifts away from abrasive sheet 16 and locking face 23 in such a manner that abrasive sheet 16 can easily be pulled out of the widening gap.

Figure 4 shows a top view of abrasive sheet carrier 14 of a manual grinding tool 100 with a further embodiment of abrasive sheet-clamping device 340, 500 according to the invention.

The front side of abrasive sheet carrier 14 is seen on the right, whereby a pivoting lever 500 is shown on its top side, which said pivoting lever, with its clamping jaw 510, presses an abrasive sheet end 155 of an abrasive sheet 150 downward toward the top side of abrasive sheet carrier 14 and retains it there. Pivoting lever 500 is capable of being pivoted against the spring force of a leg spring (not shown) in the release direction, as indicated by directional arrow 560; when the end position is reached, abrasive strip end 155 can be pulled out under clamping jaw 510. If pivoting lever 500 is pivoted via its handle 520—as shown on the left—in the direction of arrow 550, abrasive sheet end 155 is clamped tightly. Since pivoting lever 500 follows sandpaper end 155, when said sandpaper is pulled outwardly, the abrasive sheet is clamped increasingly more tightly.

Abrasive sheet end 155—shown on the left—is clamped tightly at the rear side of manual grinding tool 1000 between a clamping jaw 340 that is composed of an active jaw 360 and a passive jaw 380. Active clamping jaw 360 is formed by a wire bracket 370. Said wire bracket 370 is bent nearly in the shape of a

1 semicircle—starting at swivel axis 400 and extending toward the left, as seen in
2 the drawing—whereby it forms the crossbar-shaped active clamping jaw 360
3 from a radially inwardly bent region, bent at a right angle outwardly and/or axially.
4 Said active clamping jaw extends parallel to the rear transverse edge of abrasive
5 sheet carrier 14 at a distance from it and transitions—on the other side, with
6 mirror symmetry to the bent region of wire bracket 370—into an identically
7 semicircularly bent second region that bears with its rear region on the top side of
8 abrasive sheet carrier 14.

9
10 Spring bracket 370 transitions from its region bent in the shape of a “c” at its two
11 symmetrical contact surfaces on the top side of abrasive sheet carrier 14, both of
12 which said spring brackets are bent nearly perpendicularly outwardly parallel to
13 the top surface of abrasive sheet carrier 14 into one axle stub 410 each, each
14 axle stub forming—together with one groove 430 each between two projections
15 440 designed in the manner of abutments—a rocker pivot around swivel axis
16 400.

17
18 Adjacent to axle stub 410, each wire bracket 370 transitions outwardly into a 90°
19 bend. On the front side—as shown in the drawing—it extends parallel to
20 longitudinal axis 370 of handheld oscillating sander 10 and forms a clamping
21 lever 350 with a handle 390. On the rear side—as shown in the figure—it forms a
22 damping piece 355. With clamping tongs 340 in the clamped position, said
23 damping piece bears against the top side of abrasive sheet carrier 14 such that
24 relative motion does not occur between wire bracket 370 and abrasive sheet
25 carrier 14 when oscillating sander 10 is operated. As a result, vibrations and
26 disturbing noises are prevented when oscillating sander 10 is operated.

27
28 In the clamped position, clamping lever 350 is capable of being hung in latching
29 hook 450 in an over-latching manner. The crossbar-shaped region of active
30 clamping jaw 360 thereby bears against an elastic contact surface 420—which

1 has particularly good grip—of passive clamping jaw 380, said contact surface
2 being composed of plastic.

3
4 Contact surface 420 of passive clamping jaw 380 is formed by a rubbery strip
5 part that is secured on the outer end of passive clamping jaw 380 configured as
6 surface spring. Passive clamping jaw 360 extends parallel to the surface of
7 abrasive sheet carrier 14 and is fixed thereto by the fact that it is clamped tightly
8 under the foot-like end of oscillation body 160.

9
10 Since passive clamping jaw 380 is configured as surface spring, it does not need
11 any special means, e.g., a joint, to define swivel axis 400.

12
13 As shown on the right, i.e., on the front side, abrasive sheet carrier 14 carries an
14 abrasive sheet clamping system that corresponds in principle to that according to
15 Figure 1. The only difference is that pivoting lever 500 is preloaded in its
16 clamping position by a leg spring (not shown) instead of by a tension spring.

17
18 Figure 5 shows a schematic depiction of active clamping jaw 360 as an element
19 bent out of a single wire part. It is easy to see how clamping lever 350, after the
20 first right-angled bend, transitions into first axle stub 410, and, from there via the
21 second right-angled bend, it transitions into first semicircular wire bracket 370,
22 from there, via the third right-angled bend, it transitions into the actual, crossbar-
23 shaped active clamping jaw 360, from there, via the fourth right-angled bend, it
24 transitions into the second, semicircular wire bracket 370, from there, via the fifth
25 right-angled bend, it transitions into the second axle stub 410, and from there, via
26 the final right-angled bend, it transitions into extension 355 serving as oscillating
27 damper, which clamps against top side 140 of abrasive sheet carrier 14 with
28 preload.

29
30 Figure 6 shows a further variant for oscillation damping of second wire bracket
31 370 that is elastically clampable in the clamped position between two elastic

1 damping jaws 655, so that vibrations and noises are therefore suppressed.

2 Damping jaws 650 are located on the top side of abrasive sheet carrier 14.

3
4 Figure 7 shows a further variant for vibration damping of second wire bracket 370
5 via a leaf spring 660 which bears outwardly on its arched circumference. Via its
6 preload, wire bracket 370 and/or axle stub 410 are held against abrasive sheet
7 carrier 410 and vibrations are suppressed.

8
9 Figure 8 shows a fourth variant for oscillation damping of second wire bracket
10 370 using a damping rubber member 670 positioned around the outer axle stub
11 410, against the diagonally positioned angular surface 671 of which wire bracket
12 370 bears in the clamped position, and the oscillations of which are suppressed.

13
14 Figure 9 shows a further exemplary embodiment of a passive clamping jaw 700
15 alone, which is not composed of a surface spring 380 as in Figure 4, but rather of
16 a U-shaped spring wire piece. Between its U-legs 710, passive clamping jaw 700
17 has a connecting piece 720 on its curvature with a contact body 740 made of
18 rubber or plastic that forms a contact surface 730 for abrasive sheet end to rest
19 against and for active clamping jaw 360 to engage with (Figure 4). To dampen
20 oscillations, passive clamping jaw 700 has a crossbar-shaped connecting body
21 750 composed of plastic or rubber, the connecting body being penetrated by U-
22 legs 710.

23
24 Ends 760 of U-legs 710 bent inwardly in the shape of a circle form screw eyelets
25 that are gripped over by screws or the foot-shaped lower parts of oscillation body
26 160 and are thereby securable to abrasive sheet carrier 14.

27
28 Figure 11 is nearly identical to Figure 1 and shows a manual grinding tool 10
29 (oscillating sander) with a housing 12 that includes a handle on the outside and
30 an electric motor on the inside (not shown). An abrasive sheet carrier 14 is
31 located at the bottom of housing 12, which, driven by a motor, is capable of being

1 set into oscillating motion relative to housing 12 and, as a result, can remove
2 material from a work piece (not shown) via sanding with an abrasive sheet 16
3 secured tightly underneath on its working surface 15. The grinding dust that is
4 created is capable of being blown out and/or suctioned up from the front side 121
5 toward the rear side 122 of manual grinding tool 10 via suction connecting piece
6 120. Abrasive sheet 16 rests with its back side against the underside of abrasive
7 sheet carrier 14.

8
9 A clamping means designed as a two-armed clamping lever 20 with a swivel axis
10 24 is positioned in the front on top side 13 of abrasive sheet carrier 14.

11
12 Reference is made to the description of Figure 1 regarding the remaining details
13 of clamping lever 20.

14
15 As viewed on the right, a clamping-tensioning device configured as tongs 34 is
16 located on the rear side 122 of abrasive sheet carrier 14, the clamping-tensioning
17 device deviating from that according to Figure 1 in that it is composed of parts of
18 wire and/or spring steel sheet having intrinsic spring action. It is composed of a
19 clamping lever 35 with active clamping jaw 36 having multiple bends and/or
20 curves, the active clamping jaw conforming in principle to that according to
21 Figure 5, but with a slightly altered contour of the curved region. It has a handle
22 39 which forms a two-armed lever which is pivotable around a swivel axis 40—
23 which is secured in simple fashion using a screw 510—formed by a groove (not
24 shown) on top side 13 of abrasive sheet carrier 14. Active clamping jaw 36 is
25 composed of bent spring steel wire. A clamping lever 370 made of corrugated
26 spring sheet bearing against the inner contour of active clamping jaw 36 when
27 abrasive sheet 16 is clamped is also pivotable around the geometric extension of
28 pivot axis 40, the clamping lever forming passive clamping jaw 38. The other
29 abrasive sheet end 17 that is diametrically opposed to first abrasive sheet end 19
30 is inserted and retained between passive clamping jaw 38 and active clamping
31 jaw 36.

When tongs 34 with retained sandpaper end 17 are pivoted around swivel axis 40 in the counterclockwise direction, the distance between sandpaper ends 17, 19 relative to each other increases. As a result, abrasive sheet 16 is tightened and pulled tightly against the underside of abrasive sheet carrier 14. The tightening of abrasive sheet 16 becomes noticeable via the rear lower edge 118 of cushion 18 that is pressed round in shape.

When tongs 34 are in the clamped position, springy clamping lever 35 assumes an end position in which handle 39 is snapped into locking groove 49 of lateral latching hook 48. By pressing clamping lever 35 toward housing 12, said handle comes out of locking groove 49 and can thereby pivot freely back into its open position. Passive clamping jaw 38, which springs back into its own position, thereby acts on said handle and carries it along into the “opened” position. Clamping lever 35 is capable of being pivoted further by hand to an end position forming a wide opening slit 500 (Figure 2) between active clamping jaw 36 and passive clamping jaw 38. In this end position, tongs 34 are opened wide and the distance between active clamping jaw 36 and passive clamping jaw 38 is so great that sandpaper end 17—indicated with the dashed line—can be inserted into tongs 34 quasi blindly and in a self-locating manner without it having to be bent further upward out of the plane of working surface 15.

The surface spring 370, which self-tensions passive clamping jaw 38, having the form of a one-and-a-half sine wave with a small amplitude region toward the clamping point determines and/or limits the clamping force between active clamping jaw 36 and passive clamping jaw 38 in the clamped state, whereby, when surface spring 270 is short in design, a very strong clamping force is achieved, accompanied by a good hinged joint function.

If, to replace the abrasive sheet, clamping lever 35 is released from its clamped position by unlatching it from latching hook 48 and is pivoted around axis 40 in the clockwise direction, the distance between the clamping points of sandpaper

ends 17, 19 becomes shorter once more, whereby abrasive sheet 16, relieved of tension, is simultaneously capable of being easily removed from opening slit 500.

Figure 12 shows the horizontally situated tongs 34 with manual grinding tool 10 according to Figure 11 opened with loosely inserted sandpaper end 17. By pivoting clamping lever 35 in the counterclockwise direction, active clamping jaw 36 moves closer to passive clamping jaw 38 and thereby carries sandpaper end 17 along due to its high friction on the rubber lining—indicated by the bold line—in the direction toward passive clamping jaw 38 and clamps it tightly thereto. When active clamping jaw 36 is pivoted further, it carries passive clamping jaw with clamped sandpaper end 17 along on its pivot path, thereby tightening abrasive sheet 16 and holding it tightly in the tightened position as a result of clamping lever 35 which is latched in latching hook 48. The desired clamped position of abrasive sheet 16 is therefore created.

The means of attaining the object of the invention, according to the invention, are not limited to the arrangement of a self-clamping lever system on the side diametrically opposed to the tongs; instead, a conventional clamping lever system with spring preload can also be provided.